The Delphic Bee: Bees and Toxic Honeys as Pointers to Psychoactive and Other Medicinal Plants

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THE DELPHIC BEE: BEES AND TOXIC HONEYS AS POINTERS TO PSYCHOACTIVE AND OTHER MEDICINAL PLANTS

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Ott, Jonathan (*Natural Products Co., Apartado Postal 532, Xalapa, Veracruz, México*). THE DELPHIC BEE: BEES AND TOXIC HONEYS AS POINTERS TO PSYCHOACTIVE AND OTHER MEDICINAL PLANTS. *Economic Botany 52(3):260–266, 1998. Herein a brief review, with 49 references, of the history and phytochemistry of toxic honeys, in which bees have sequestered plant secondary compounds naturally occurring in plant nectars (floral and extrafloral). It is hypothesized that such toxic honeys could have served as pointers to psychoactive and other medicinal plants for human beings exploring novel ecosystems, causing such plants to stand out, even against a background of extreme biodiversity. After reviewing various ethnomedicinal uses of toxic honeys, the author suggests that pre-Columbian Yucatecan Mayans intentionally produced a psychoactive honey from the shamanic inebriant* Turbina corymbosa *as a visionary substrate for manufacture of their ritual metheglin,* balché.

LA ABEJA DÉLFICA: ABEJAS Y MIELES TÓXICAS COMO INDICADORES DE PLANTAS PSICOACTIVAS Y OTRAS PLANTAS MEDICINALES. *Se presenta una breve reseña, con 49 citas bibliográficas, de la historia y fitoquímica de mieles tóxicas, en las cuales las abejas han secuestrado compuestos secundarios de plantas, de ocurrencia natural en sus néctares (florales y extraflorales). Se hipotiza que semejantes mieles tóxicas podrían haber funcionado como indicadores hacia plantas psicoactivas y otras plantas medicinales, para seres humanos explorando ecosistemas novedosos, haciendo destacar semejantes plantas, aún contra un trasfondo de biodiversidad extrema. Después de reseñar varios usos etnomedicinales de mieles tóxicas, el autor sugiere que los mayas yucatecos precolombinos produjeron a propósito una miel psicoactiva del embriagante chamánico* Turbina corymbosa *como substrato visionario de su aloja ritual* balché.

Key Words: *balché*; meads; *Turbina corymbosa*; entheogens; Mayan Indians; *Lonchocarpus violaceus*.

Tradition holds the famous Delphic Oracle was revealed by a swarm of bees, and the Pythia or divinatory priestesses in Delphi's Temple of Apollo were affectionately called 'Delphic Bees', while virgin priestesses of Greek Goddesses like Rhea and Demeter were called *melissai*, 'bees'; the hierophants *essenes*, 'king bees'. Great musicians and poets like Pindar were inspired by the Muses, who bestowed the sacred enthusiasm of the *logos*, sending bees to anoint the poets' lips with honey (Ransome 1937). Some hold the vatic revelations of the Pythia were stimulated by inhaling visionary vapors of henbane, *Hyoscyamus niger* L., issuing from a fumarole over which the Delphic Bees were suspended, and into which the plant had been cast (Rätsch 1987). The primordial Eurasian entheogenic plant *soma/haoma*, known in the *Vedas* as *amrta*, the potion of immortality, was called *ambrosia* by the Greeks, and with *nektar*, the other sustenance of the Immortals, was associated with bees and honey (Roscher 1883). This curious lore may represent a sort of mythological fossil, concealing a hitherto overlooked mechanism of drug-discovery. I suggest that immemorial pursuit of wild honey, the only concentrated sweet which occurs naturally, could have led inexorably to the discovery of psychoactive and other toxic honeys, while subsequent observation of bees' foraging habits could easily have led preliterate shaman/pharmacognosists to single out toxic plant species, even against a background of extreme biodiversity, as in Amazonia.

Xenophon's 4th century B.C. *Anabasis* (IV, VII, 20) described psychoactive honey-poisoning during the 'Retreat of the Ten Thousand' in

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the ill-starred expedition of Cyrus. Countless soldiers in the Greek army, encamped near Trebizonde in Asia Minor, ate liberally of honey found there, "lost their senses and vomited," and "resembled drunken persons." Pliny (XXI, XLV) described madness-inducing honey from this area as *meli mænomenon* ('mad honey'), and also mentioned (XXI, XLVI) a medicinal honey from Crete, *miraculum mellis* or 'wondrous honey' (Halliday 1922; Ransome 1937). The 6th–8th century B.C. *Homeric Hymn to Hermes* referred to *melissai* or bee-oracles from Delphi's Mt. Parnassos, who could prophesy only after ingesting *meli chloron* or 'green honey', perhaps a reference to Pliny's 'mad honey'. It was conjectured that these bee-oracles were the Pythia, hence psychotropic honey could have been a catalyst for the mantic utterances of the Delphic Bees (Mayor 1995). It is thought the source of *meli mænomenon* was *Rhododendron ponticum* L., which contains toxic glucosides called andromedotoxins or grayanotoxins (Krause 1926; Plugge 1891; Wood, et al. 1954), found in other species of Ericaceæ, notably *Kalmia latifolia* L., another plant whose honey has provoked poisonings (Howes 1949; Jones 1947). Grayanotoxins occur in North American toxic honeys, presumably from *K. latifolia* (Scott, Coldwell, and Wiberg 1971). Frequent honey poisonings in Japan (Kohanawa 1957; Tokuda and Sumita 1925) were traced to ericaceous *Tripetaleia paniculata* Sieb. et Zucc., and grayanotoxins were found in these honeys (Tsuchiya et al. 1977). Another toxic glucoside, ericolin, is known from ericaceous *Ledum palustre* L., and from honeys derived from this plant, which caused human poisonings (Kozlova 1957; Palmer-Jones 1965). Both *L. palustre* and *L. hypoleucum* Kam. are used as shamanic inebriants by Tungusic tribes of Siberia (Brekhman and Sam 1967); while 'Labrador tea', *L. groenlandicum* Oeder of the Kwakiutl Indians is said to have 'narcotic properties' (Turner and Bell 1973). Similarly, the well-known ericaceous *kinnikinnick*, *Arctostaphylos uva-ursi* (L.) Sprenger, is smoked as an inebriant by Kwakiutl and other North American Indians (Ott 1993; Turner and Bell 1973), pointing to possible content of ericolin or grayanotoxins.

An 'epidemic' of honey poisoning in New Zealand was traced to honeydew or excrement of *Scolypopa australis* Walker, which had fed on leaves of *tutu*, *Coriaria arborea* Lindsay, Coriariaceæ (Palmer-Jones 1947; Palmer-Jones 1965; Palmer-Jones and White 1949). 'Mellitoxin' isolated from the honey was identical to hyænanchin from euphorbiaceous *Hyænanche globosa* Lamb; and a second honey toxin, tutin, is found in *C. arborea* (Clinch and Turner 1968; Palmer-Jones 1965). This leaf-hopper had transformed tutin from *tutu* leaves into hyænanchin during digestion; the bees making honey from its excrement. Symptoms of this honey poisoning included giddiness, delirium and excitement, suggesting toxicological relationship to the Ecuadorian shamanic inebriant *C. thymifolia* Humb. et Bonpl. ex Willd., *shanshi*, used to induce sensations of flight (Naranjo 1969). Preliminary investigations of *shanshi* suggested presence of a toxic glucoside (Naranjo and Naranjo 1961).

Solanaceæ are known both for shamanic inebriants and toxic honeys. Human honey poisonings in Hungary were traced to *Atropa belladonna* L. or *Datura metel* L., and symptoms resembled those of tropane alkaloids scopolamine and hyoscyamine found in both (Hazslinszky 1956). Polish honey poisonings were traced to *D. inoxia* Miller (=*D. meteloides* DC. ex Dunal), and scopolamine found in the honey (Lutomski, Debska and Gorecka 1972). Both scopolamine and atropine were detected in toxic honey from Colombia, of unknown provenience (Barragán de Domínguez 1973). Perhaps *Brugmansia* species were involved—these Andean shamanic inebriants (Ott 1993) yield toxic honeys (Lockwood 1979). Indole alkaloid gelsemine could account for honey poisoning from loganiaceous *Gelsemium sempervirens* (L.) Aiton in 19th century South Carolina—symptoms also included giddiness (Kebler 1896).

Brasilian inebriating honey from stingless bee *Trigona recurva* Smith is called *feiticeira* ('sorceress') or *vamo-nos-embora* ('let's go!')—in "allusion to the reeling, half-drunken condition in which one falls after partaking of this honey" (Ihering 1903[4]). *Mombuca*, Argentine stingless bee (*Melipona* sp.) honey had "inebriating effects owing to the fact that the little bees harvest it from some flowers with narcotic properties" (Spegazzini 1909). Toxic honeys *orecer-och* and *overecepes* occur in Chiquitos, Bolivia; also a delicious honey, *omocayoch*, said to be as inebriating as liquor (D'Orbigny 1839); while a Paraguayan honey was characterized "as intoxicating as aqua vita" (Schwarz 1948).

Fig. 1. Flowers of *Turbina corymbosa* or *xtabentún*, source of the famous Mayan ethnomedicinal honey; Isla Cozumél, Quintana Roo, México.

So at least three categories of psychoactive phytotoxins—indole and tropane alkaloids and glucosides—occur in toxic honeys, and likewise in nectars from which such are made (*vide*: reviews of non-sugar floral-nectar chemistry: Baker 1977; Baker and Baker 1983). Psychoactive cannabinoids occur in pollen of marijuana, cannabinaceous *Cannabis sativa* L. (Paris, Boucher and Cosson 1975). Pollen toxins could be sequestered by bees in honeys, as are nectar or honeydew toxins. *Cannabis* nectar likely also contains cannabinoids, explaining a common belief of marijuana growers, that marijuana honeys are psychotropic.

One of the more recondite Mesoamerican inebriants is the Mayan metheglin *balché*, a mead of stingless-bee honey, water and bark of leguminaceous *balché*, *Lonchocarpus violaceus* (Jacquin) DC. (Gonçalves de Lima, et al. 1977). *L. violaceus* is psychoactive, owing to content of longistylines (Delle Monache, et al. 1977) or piscicidal rotenone, and Mayaist C. Rätsch proposed other shamanic inebriants, like psilocybian mushrooms and *ololiuhqui* (*Turbina corymbosa* [L.] Rafinesque, *xtabentún* in Mayan; Fig. 1), were once added to *balché* (Rätsch 1992). Rätsch thought feasible my suggestion that *xtabentún* may have been a *balché* ingredient, as honey rich in psychotropic ergoline alkaloids of this Convolvulaceæ (Hofmann 1963)—noting the Lacandón Indians, avid *balché* consumers, know of inebriating honeys. Contemporary shamanic use of *T. corymbosa* has not been documented among the Mayans, but is all but universal among indigenous groups in Oaxaca, and occurs elsewhere in México (Lipp 1991; Wasson 1963). Besides psychoactivity, ergolines have potent uterotonic effects, and seeds of *ololiuhqui/xtabentún* are also used as ecbolics/oxytocics (to precipitate childbirth) by indigenous groups in Oaxaca (Browner 1985; Ortíz de Montellano and Browner 1985). 'Virgin honey' of stingless bees (*Trigona* sp.) is used in ethnogynecology in Huejutla, Hidalgo (Ramos-Elorduy de Conconi and Pino Moreno 1988), and R.L. Roys documented use of wild stingless-bee honey in Mayan ethnogynecology, noting of *Tabentun* (*xtabentún*, identified as convolvulaceous): "the aromatic honey from its flower is said to be the source of a potent drink" (Roys 1931). Oaxacan Mixe use *T. corymbosa* as a shamanic inebriant, and also employ "special honey" from *Trigona* sp. as an ethnogynecological remedy (Lipp 1991). Clavigero highly praised *estabentùn* honey (Clavigero 1780); entomologist H.F. Schwarz attributed *xtabentún* honey to *Melipona beecheii* Bennett, noting it was still produced in Yucatán in the 1940s, being the most esteemed of many ethnomedicinal Mexican honeys (Schwarz 1948). An article on Mayan apiculture described situating hives near natural stands of *xtabentún*, noting "all their honey comes from this flower. No other is allowed to prosper in the immediate vicinity" (Mediz Bolio 1974). These clues suggest *colelcab* (*M. beecheii*) *T. corymbosa* honeys were produced intentionally and much esteemed for constituent ergoline alkaloids conferring uterotonic and psychoactive properties. Such honeys may have been exploited by the Mayans in fabrication of their ritual metheglin *balché*, endowing the sacred inebriant with the plant's legendary and chemically-verified entheogenic properties.

Field work in Yucatán and Quintana Roo revealed *xtabentún* honey was no longer of economic importance, and traditional Mayan hollow-log apiculture was found sadly degenerated (Fig. 2, 3). We failed to obtain samples of *xtabentún* honey for bioassay and chemical analy-

Fig. 2. Sr. and Sra. Rufino Solís with thatched-roof apiary of hollow-log hives of *colelcab* at Rancho Xbacóc near Espita, Yucatán, México. Photo: J. Ott.

sis, but attempts to produce it are underway. In Mérida and Valladolid, Yucatán, there survives production of a distilled liqueur from fermented honey, and known as *Xtabentún*! A modern liqueur named for a pre-Columbian entheogen, is yet another clue pointing to existence of inebriating *T. corymbosa* honey, and its probable use as traditional fermentation substrate for the sacred Mayan metheglin *balché*.

Fig. 3. Typical hollow-log hive of *colelcab* as tourist attraction in courtyard of hotel in Valladolid, Yucatán, México. Photo: J. Ott.

Xtabentún liqueur and conjectured use of psychoactive honey in *balché* have parallels in the classical and modern worlds. Pliny noted *meli mænomenon* of Asia Minor was made into a mead or metheglin, and toxic Ericaceæ honey was traditionally added to alcoholic beverages in the Caucasus, to enhance their inebriating properties; while such toxic honey, *deli bal*, is taken in Turkey as a tonic in milk. *Deli bal* was an important export from this region in the 18th century, widely used to potentiate liquors in Europe—called *miel fou*, 'crazy honey' in France (Mayor 1995). "Very intoxicating" honey, likely from *Kalmia* spp. (mountain laurel) was used in 18th century New Jersey to 'spike' liquor sold under the appropriate trade-name 'Metheglin' (Jones 1947; Kebler 1896).

Toxic honeys are not unusual (I have intentionally ignored the literature on non-psychoactive plant [and industrial] toxins sequestered in honeys), nor are accidental inebriations by psychoactive honeys exceptional. In satisfying the universal human "sweet tooth" during human explorations of any given ecosystems, foragers would encounter psychoactive and other toxic

Fig. 4. Ah-Muzen-Cab, Mayan bee-god, above his pyramid-top temple at Tulúm, Quintana Roo, México. Photo: J. Ott.

honeys. Having consumed such honeys and experienced psychoactive or other medicinal properties of their contained alkaloids and allied phytochemicals, it would require no special technology nor great imagination to follow the bees to the nectar source, thereby easily finding valuable plants. It has been suggested that ethnomedicinal and culinary plants were discovered by a systematic process of ingesting all species, in the eternal search for food. Some have questioned whether such an extensive bioassay program were feasible in areas of extraordinarily-high biodiversity, such as Amazonia, thought to be home to at least 80000 species of higher plants (Schultes 1988)! Apart from observation of the effects of bioactive plants on domestic and wild animals, serendipitous encounters with phytotoxins in honeys could have served as highly-specific and efficient pointers to medicinal, especially psychoactive, plants, which would thus stand out in deep relief, even against a backdrop of extreme phytodiversity.

There is evidence that in the case of *T. corymbosa* among the Yucatecan Mayans, a toxic honey may have attained exalted status as a preferred method of ingesting a psychoactive plant, even being produced intentionally. These Mayans came to worship bee-gods like Ah-Muzen-Cab, 'Great Lord Bee', who can be seen descending even today, above the entrances to pyramid-top temples at Tulúm and Cobá, his ancestral home (Fig. 4). Much as we sweeten our bitter medicines with sugary syrups, bees collecting toxic nectars from flowers might naturally have prepared and concentrated a sweetened drug for the delectation of awed human votaries of Ah-Muzen-Cab and his industrious, heavenly host.

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Book Review

The Green Pharmacy. James A. Duke. 1997. Rodale Press, Inc., 33 E. Minor St., Emmaus, PA. xvii + 507 pp. (hardcover). $29.95. ISBN 0-87596-316-1.

Before starting this review, I must confess that I have been a proponent of Jim Duke's since I was a graduate student. At the time he was legendary among students. We considered him the wild man who went into the Panamanian forests of Darien where he stayed collecting plants until his assistants were forced to drag him out when he became delirious with an infection. This book contains more of Duke's personality than any of his others. Those tomes were dry compendia of facts, and encyclopedias dictated by his job at USDA. This book contains Jim Duke on every page; his irreverent humor; his perceptive view of scientists of all kinds; and his empathy with people who do not live in a "First World" country.

This book will likely make some other authors of herbal books jealous and furious. First, Duke has a more open-minded approach to uses and possible uses than some of those books. Jim is not bound hopelessly to clinical research results and understands that every individual reacts differently. Second, those other authors will be angry at the lost income Jim's book will produce when it out-competes theirs.

Green Pharmacy is divided into two parts (three really, because there is an autobiographical postscript at the end). The first part is a guide to the green pharmacy. Here he provides the common-sense rules for using herbal medicines and gives the proper caveats for those who do not think for themselves. Let us hope the warnings are heeded by those looking for a quick escape from day-to-day tedium. The second part is an alphabetical listing of the herbs that heal (pp. 24–464). These herbs are provided, not by species as most devout biologists would have done, but by the malady. The sequence goes from "Aging" to "Yeast Infections." In between these entries are many others along with the plants that Duke thinks may help. He even provides a ranking system to show those that are probably better than the others.

No one reading this book should expect the plants listed to provide miracle cures. They will *not* be equivalent to the impacts of penicillin or its successors. Still, the compounds the plants contain have been used for millennia by people around the world who recognized their value and effectiveness. No one with a stomach ulcer, for example, should expect ginger, licorice, banana, cabbage, calendula, garlic or the other eight species listed to cure them. Instead, these are plant that, when used as Duke suggests, will aid the problems associated with the disorder—in many individuals. Repeatedly, Duke demands that individuals should consult their physicians about using these plants.

I have not enjoyed one of Duke's books this much since I first read his narrowly known *Lewd Latin Lexicon* back in the 1960s. Nor have I read another book on herbal medicines in the past couple decades that was as clear-minded and instructive as this one. For all interested in plants and medicines, this book is a "must-read" item.

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